

REMARKS

This paper outlines the claims with preliminary amendment, and also distinguishes the currently amended claims from the previously cited references, responding to the final office action dated January 09, 2009.

Claims 1, 2, 4-10, 13-17, 19 and 42 remain pending in this application. In view of the following remarks, Applicant requests further examination and reconsideration of the present patent application.

Claim Amendments

Claim 1 has been amended to reflect – "said system configured to flexibly control production of hydrogen and electricity on demand."

This feature of flexibility of operation is recited in the present application at Page 18 – line 10-16 among other places. Thus, the claim amendment does not introduce any new subject matter.

35 USC 102

Applicant respectfully traverses the rejection of claims 1, 2, 4-9, 13, 15, 16 and 19-42 under 35 USC §102(b), as being anticipated by Hansen et al. (U.S. Patent No. 5,380,600 Hansen, hereinafter "Hansen").

First, as discussed in the previous office action, the system described in Hansen does not produce a hydrogen stream. Hansen recites a closed loop system that produces (only) electricity using the Molten Carbonate Fuel cell. As clearly seen from Fig. 1, hydrogen separated from the anode exhaust in hydrogen recovery unit 18 is recycled to anode supply line 40 via line 90 (Hansen, column 3, lines 34-38) and is not a product of the system as such.

Second, presently amended claim 1 recites *inter alia*, "said system configured to flexibly control production of hydrogen and electricity." Applicant submits that Hansen does not describe a system producing both hydrogen and electricity and it lacks any features that render flexibility of controlling the production on demand. On the contrary, the present application clearly describes on page 18, lines 10 – 16 that the fuel cell

assembly is operated on low utilization mode wherein the anode exhaust stream comprises a higher amount of unutilized hydrogen, which may be recovered for export using the separation unit downstream of the fuel cell assembly. This gives the system flexibility to cater to varying demands of hydrogen and electricity.

Hansen does not contemplate such a flexible system and hence is missing system features, which render it incapable of anticipating the features of present inventions.

Therefore, Applicant submits that Hansen, does not disclose every element of independent claim 1 and does not anticipate it under 35 USC 102(b). Claims 2, 4-10, 13-17, 19 and 42 depend directly or indirectly from claim 1. Applicant respectfully requests that the Examiner withdraw the rejection under 35 USC 102.

The Examiner further mentions on page 7 of Office Action that the cited passage is directed to the method of operation, while the claim language is an apparatus. The method of operating does not further limit the apparatus. Applicant respectfully differs. As recited by *In re Luck*, 177 U.S.P.Q. 523, 525 (C.C.P.A. 1973), "it is well established that product claims may include process steps to wholly or partially define the claimed product." To the extent that "these process limitations distinguish the product over the prior art, they must be given the same consideration as traditional product characteristics." *Id.* (emphasis in original). These claims are not product-by-process claims. A product-by-process claim defines a product by laying out the method steps required to produce the product. See *Atlantic Thermoplastics Co. Inc. v. Faytex Corp.*, 23 U.S.P.Q.2d 1481, 1490 (Fed. Cir. 1992). This is far different from a mixed limitation or hybrid claim that includes a functional limitation, but does not define the product solely by method steps. The general rule for interpreting hybrid claims is that all limitations are to be given patentable effect. See *In re Angstadt*, 190 U.S.P.Q. 214, 217 (C.C.P.A. 1976).

35 USC §103

The Examiner has rejected claims 1, 2, 3-10, 15, 17, 19 and 42 under 35 USC §103(a) as being unpatentable over Farooque (U.S. Patent No. 5,084,362, hereinafter "Farooque") in view of Nakamura et al. (U.S. Patent No. 7,052,790, hereinafter "Nakamura") as evidenced by Baker (U.S. Patent No. 3,522,101, hereinafter "Baker"). The Examiner has further rejected claims 13, 14 and 16 35 USC §103(a) as being

unpatentable over Farooque and Nakamura as applied to claims 1 and 15 and in further view of Sridhar et al. (U.S. Publication No. 2004/0202914, hereinafter "Sridhar").

First, Independent claim 1, recites a system wherein a portion of the anode exhaust is recycled back to the anode inlet.

It is Applicant's position that Farooque is missing in these features. Fig. 1 from Farooque is shown below.

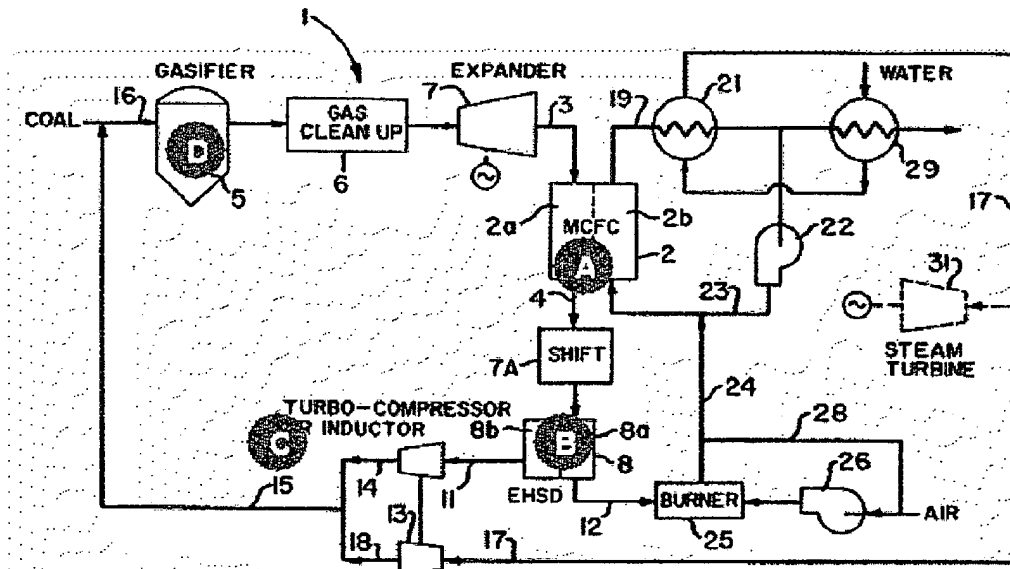


FIG. 1

Farooque discusses on Column 2, lines 15 – 20, "This results in an anode exhaust stream containing unused or unspent hydrogen, water, small amounts of methane and carbon monoxide and substantial amounts of carbon dioxide. This anode exhaust stream is delivered from the anode section 2a to an anode exhaust line 4".

Further, on column 2, lines 54 – 61, Farooque recites – "the anode exhaust stream in the line 4 is first fed through a shift converter 7A which increases the hydrogen content in the stream by converting any CO in the stream to hydrogen. After shift converting, the exhaust stream is fed to a hydrogen separation and recovery device 8 which separates and recovers the unspent hydrogen in the stream from the other constituents."

Thus, similar to the present invention, the system of Farooque involves a fuel cell

(labeled "A"), a Gas separation system (labeled "B") to produce hydrogen gas (labeled "C". However, the similarity of the system described in the present invention and system of Farooque ends here. As clearly recited by Farooque in Column 3, lines 5 – 8, "The pressurized hydrogen is then delivered via lines 14 and 15 to the input feed line 16 to the gasifier." Thus the hydrogen (C) extracted from anode exhaust is sent to gasifier "D" and not fuel cell "A".

Farooque recites the following with respect to the gasifier.

1. column 2, lines 41 - 49 : "In order for the gasifier 5 to process the input coal feedstock, it is additionally necessary that the gasifier be provided with hydrogen and steam to sustain the gasifier reactions. In accordance with the principles of the present invention, the hydrogen required for the gasifier 5 is derived from the fuel cell itself and, in particular, from the unspent hydrogen in the anode exhaust stream."
2. column 2, lines 21 – 26 : "To promote overall efficiency of the system 1, the supply fuel used for the fuel cell 2 and delivered to the supply line 3 comprises methane. The methane fuel is generated by a conventional methane producing gasifier 5."

Thus the gasifier produces methane and not hydrogen. Accordingly the fuel sent to the anode inlet of fuel cell (A) is methane and not hydrogen (emphasis added). The recycled portion (hydrogen) of the anode exhaust is chemically changed to methane. Hydrogen (H_2) and methane (CH_4) are clearly very different compounds; hence Applicant submits that Farooque does not teach a system wherein a portion of the anode exhaust is recycled back to anode inlet.

Further, if the Farooque is hypothetically modified to recycle hydrogen to fuel cell A instead of gasifier D, this modification will render Farooque inoperable since the gasifier will not receive any hydrogen to convert coal to methane as recited by above text from Farooque. Hence such hypothetical modification to Farooque by combination with any reference cannot be used to anticipate or render the claims of present application obvious, since that would change the principle of operation of Farooque.

Further, claim 1 recites, features of system "produce a hydrogen rich stream" and "said system configured to flexibly control production of hydrogen and electricity." Thus, to anticipate or render the claims obvious, the system recited in the reference has to produce both hydrogen and electrical energy and it and have a flexibility of operation to produce either based on demand. Farooque, as shown in FIG. 1, recites a closed loop

Application No. 10/731,373
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system and produces only electrical energy. Thus it lacks features of co-production of hydrogen and electricity. A combination with any of the secondary references does not overcome this deficiency.

At least for these reasons among others, Applicant submits that the combination of these references does not teach, suggest or disclose the invention as recited in claim 1 and hence any of the claims dependent directly or indirectly on claim 1. Applicant respectfully requests that the Examiner withdraw the rejection under 35 USC 103.

Summary

For the reasons set out above, Applicant respectfully submits that the application is in condition for allowance. Favorable reconsideration and allowance of the application are, therefore, respectfully requested.

If the Examiner believes that anything further is necessary to place the application in better condition for allowance, the Examiner is kindly asked to contact Applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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April 09, 2009